PATENT COOPERATION TREATY

From the
INTERNATIONAL SEARCHING AUTHORITY

To:

see form PCT/ISA/220

PCT

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

(PCT Rule 43*bis*.1)

Date of mailing
(day/month/year) see form PCT/ISA/210 (second sheet)

Applicant's or agent's file reference
see form PCT/ISA/220

FOR FURTHER ACTION
See paragraph 2 below

International application No.	International filing date *(day/month/year)*	Priority date *(day/month/year)*
PCT/IB2005/001867	30.06.2005	

International Patent Classification (IPC) or both national classification and IPC
H04L27/26, H04L1/06

Applicant
NOKIA CORPORATION

1. This opinion contains indications relating to the following items:

- ☒ Box No. I Basis of the opinion
- ☐ Box No. II Priority
- ☐ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- ☐ Box No. IV Lack of unity of invention
- ☒ Box No. V Reasoned statement under Rule 43*bis*.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- ☐ Box No. VI Certain documents cited
- ☐ Box No. VII Certain defects in the international application
- ☐ Box No. VIII Certain observations on the international application

2. **FURTHER ACTION**

If a demand for international preliminary examination is made, this opinion will usually be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA"). However, this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notifed the International Bureau under Rule 66.1*bis*(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of three months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA/220.

3. For further details, see notes to Form PCT/ISA/220.

Name and mailing address of the ISA:

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WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/IB2005/001867

Box No. I Basis of the opinion

1. With regard to the **language**, this opinion has been established on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.

   ☐ This opinion has been established on the basis of a translation from the original language into the following language , which is the language of a translation furnished for the purposes of international search (under Rules 12.3 and 23.1(b)).

2. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application and necessary to the claimed invention, this opinion has been established on the basis of:

   a. type of material:

   ☐ a sequence listing

   ☐ table(s) related to the sequence listing

   b. format of material:

   ☐ in written format

   ☐ in computer readable form

   c. time of filing/furnishing:

   ☐ contained in the international application as filed.

   ☐ filed together with the international application in computer readable form.

   ☐ furnished subsequently to this Authority for the purposes of search.

3. ☐ In addition, in the case that more than one version or copy of a sequence listing and/or table relating thereto has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.

4. Additional comments:

Box No. V Reasoned statement under Rule 43*bis*.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes:	Claims	1-18
	No:	Claims	
Inventive step (IS)	Yes:	Claims	1-18
	No:	Claims	
Industrial applicability (IA)	Yes:	Claims	1-18
	No:	Claims	

2. Citations and explanations

see separate sheet

Re Item V.

1 Reference is made to the following documents:

D1 : SHOUSHENG HE ET AL: "A new approach to pipeline FFT processor" PARALLEL PROCESSING SYMPOSIUM, 1996., PROCEEDINGS OF IPPS '96, THE 10TH INTERNATIONAL HONOLULU, HI, USA 15-19 APRIL 1996, LOS ALAMITOS, CA, USA,IEEE COMPUT. SOC, US, 15 April 1996 (1996-04-15), pages 766-770, XP010165053 ISBN: 0-8186-7255-2

2 Document D1, which is considered to represent the most relevant state of the art, discloses (the references in parentheses applying to this document):

A signal processor for Fast Fourier Transformation, FFT, of an input data stream,

a Fast Fourier Transformation device configured to perform Fast Fourier Transformation of a data stream supplied at an input terminal thereof

and to output the FFT transformed data stream at an output terminal thereof (fig. 1),

characterized in that

each of the input data stream contains a number of $N=2^k$ samples,

the Fast Fourier Transformation device has a pipeline architecture composed of k stages with a respective feedback path including a single delay element per each stage of the pipeline architecture (fig. 1) and is controlled by a first and second internal control signals (figs. 4 & 5) ,

the delay element in a feedback path of an ith stage of the pipeline architecture imposes a delay of $N/2^i$ samples (fig. 4),

From this, the subject-matter of independent claim 1 differs in that:

claim 1 address multiple parallel data streams, M_R and,

the first internal control signal is clocked M_R times faster compared to a clock rate at which the samples of the M_R streams are supplied, and

the second internal control signals are clocked M_R times slower compared to

the first internal control signal.

2.1 The subject-matter of claim 1 is therefore novel (Article 33(2) PCT)
The problem to be solved by the present invention may be regarded as:
How perform an FFT on parallel received streams.

2.2 The solution to this problem proposed in claim 1 of the present application is considered as involving an inventive step (Article 33(3) PCT) for the following reasons:
The parallel streams are first multiplexed before performing the FFT unlike the method of performing an FFT on each of the streams individually as is known to the person skilled in the art.

3 A similar argument as in section 2 of the opinion applies to related independent claims 10 and 17.

4 Claims 2-9 are dependent on claim 1, claims 11-16 are dependent on claim 10 and claim 18 is dependent on claim 17, and as such also meet the requirements of the PCT with respect to novelty and inventive step.